

5. SPECIAL FEATURES

RL250

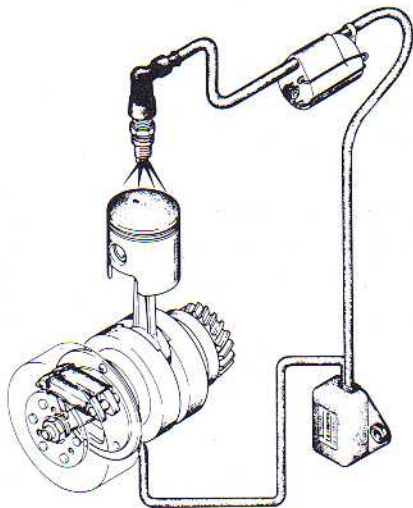
5-1. Engine

The engine mounted on the Model RL250 is of single-cylinder design. It is built with a special aluminum-alloy cylinder and a cast iron sleeve in order to obtain excellent cooling effect and a wider range of power capability especially suited for the observation trial bike.

5-2. New ignition system – P.E.I.

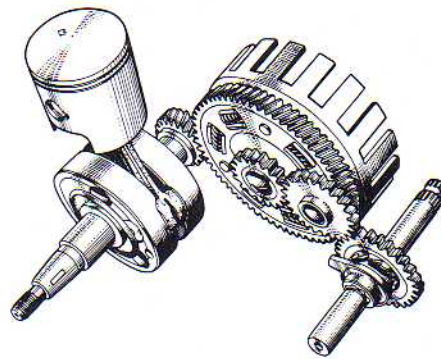
The P.E.I. system produces more energetic ignition sparks. Hence, engine starting is easier, and power delivery from the engine is more dependable throughout the entire speed range. The engine responds more quickly to throttle control.

This new system is a wide departure from the conventional system based on the mechanical make-break action of a breaker. It uses no contact points, which need refacing from time to time because of burns or wear. Its ignition timing is factory-set, and is such that neither inspection nor adjustment is required.



5-3. Primary kick starter

No need of searching for the neutral position when kicking. Just disengage the clutch and kick: the engine starts up right away, whether the transmission is in gear position or not.



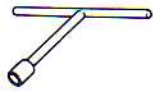
6. SPECIAL TOOLS FOR SUZUKI RL250

RL250

Special tools listed here facilitate the disassembly, assembly and other maintenance operations on the Model RL250 motorcycle. Use of makeshift or common handtools instead of the listed tools is not recommendable because they tend not only to foul up the operation but also to damage the parts. Each service shop is advised to have the complete set of listed tools as shop equipment.

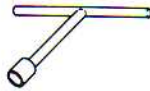
REF. NO.	TOOL NO.	TOOL NAME
1	09910-10710	8mm stud installing tool
2	09910-11510	10mm stud installing tool
3	09910-20112	Piston holder
4	09910-32810	Crankshaft installing tool
5	09910-80113	Crankshaft separating tool
6	09910-92810	Crankshaft removing tool
7	09920-51510	Clutch sleeve hub holder
8	09920-60310	Clutch sleeve hub holder handle
9	09930-40113	Engine sprocket and flywheel holder
10	09900-06904	8mm hexagon L type wrench
11	09911-70120	6mm hexagon L type wrench
12	09940-60112	Spoke nipple wrench
13	09930-30130	Rotor remover set
14	09920-70111	Snap ring opener (small)
15	09920-70120	Snap ring opener (large)
16	09913-50110	Oil seal remover
17	09913-70122	Bearing and oilseal installing tool
18	09913-80110	Bearing and oilseal installing tool
19	09940-10122	Steering stem lock nut wrench
20	09930-10111	Spark plug wrench
21	09920-20310	Clutch spring hook

8 mm stud installing tool



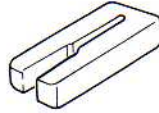
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10 mm stud installing tool



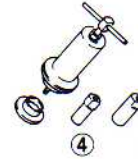
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Piston holder



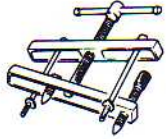
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Crankshaft installing tool



④

Crankcase separating tool



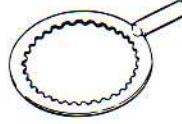
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Crankshaft removing tool



⑥

Clutch sleeve hub holder



⑦

Clutch sleeve hub holder handle



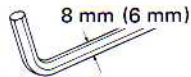
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Engine sprocket and flywheel holer



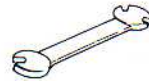
⑨

8 mm hexagon L type wrench
6 mm hexagon L type wrench



⑩ ⑪

Spoke nipple wrench



⑫

Rotor remover set



⑬

Snap ring opener (small)



⑭

Snap ring opener (large)



⑮

Oil seal remover



⑯

Bearing and oil seal installing tool



⑰

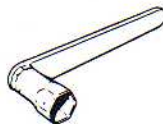
Bearing and oil seal installing tool Steering stem lock nut wrench Spark plug wrench



⑱



⑲



⑳

Clutch spring hock



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Fig. 6-1. Special tools

7. TROUBLE-SHOOTING

RL250

The following trouble-shooting guide covers the seven commonest complaints: 1) Engine will not start or is hard to start. 2) Engine runs rough. 3) Engine gives abnormal noise. 4) Engine halts suddenly. 5) Engine overheats. 6) Faulty clutch. 7) Hard gear shifting or shifting failure.

7-1. Engine will not start or is hard to start.

The first step is to make sure the fuel tank is full or has enough fuel.

	Symptom	Possible cause	Remedy
1.	Fuel is not reaching the carburetor.	(1) Fuel strainer is clogged. (2) Fuel pipe is clogged or ruptured. (3) Fuel cock is clogged.	(1) Clean (2) Clean or replace. (3) Clean, and clear with a wire.
2.	The spark plug is in good condition. Sparks jump across the gap when engine is kicked.	(1) Disturbed ignition timing. (2) Improper fuel. (Too much oil in the mixture.) (3) Defective carburetor float. (4) Loss of compression.	(1) Adjust. (2) Check the proportions, change as necessary. (3) Repair and adjust, or replace. (4) Refer to specifications.
	The spark plug looks good, but sparks are weak, reddish in color, when tested.	(1) Damaged spark plug. (2) Gap out of adjustment. (3) Damaged plug cap. (4) Damaged ignition coil. (5) Damaged exciter or pulser coil.	(1) Replace. (2) Adjust. (3) Replace. (4) Replace (5) Replace.
	No sparks jump across when tested.	(1) Damaged spark plug. (2) Dirty or wet spark plug. (3) Gap out of adjustment. (4) Damaged ignition coil. (5) Fault in the P.E.I. unit. (6) Defective ignition switch. (7) Damaged exciter or pulser coil. (8) Fault in the wiring harness.	(1) Replace. (2) Clean or dry. (3) Adjust. (4) Replace. (5) Replace. (6) Replace. (7) Replace (8) Repair or replace.
3.	Reduced engine compression.	(1) Worn cylinder or piston rings. (2) Piston rings seized in the groove. (3) Ruptured cylinder head gasket. (4) Damaged piston.	(1) Repair or replace. (2) Repair or replace. (3) Replace. (4) Replace.

	Symptom	Possible cause	Remedy
3..	Reduced engine compression.	(5) Spark plug loose. (6) Cylinder head nuts loose. (7) Leaky crankcase joints. (8) Damaged cylinder or head.	(5) Retighten. (6) Retighten. (7) Repair or replace. (8) Replace.

NOTE: "Hard engine starting" should direct your attention to these three items: FUEL, SPARKING and COMPRESSION, in that order.

7-2. Engine runs rough.

	Symptom	Possible cause	Remedy
1.	Engine obeys throttle control, but the bike will not run fast enough.	(1) Slipping clutch.	(1) Adjust clutch cable or replace clutch plates.
2.	Engine will not pick up speed.	(1) Improper carburetor setting. (2) Clogged air cleaner. (3) Clogged fuel line. (4) Ignition timing off adjustment. (5) Clogged exhaust pipe or muffler.	(1) Adjust. (2) Clean. (3) Clean. (4) Adjust. (5) Clean.
3.	Engine begins to run rough when accelerated.	(1) Ignition timing off adjustment. (2) Improper carburetor setting. (3) Dirty spark plug.	(1) Adjust. (2) Adjust. (3) Clean.
4.	Engine runs rough in low-speed range.	(1) Ignition advanced too much. (2) Dirty spark plug, or maladjusted, plug gap. (3) Maladjusted carburetor pilot air. (4) Clogged or damaged fuel line.	(1) Adjust. (2) Clean, or adjust. (3) Adjust pilot air screw. (4) Clean or replace.
5.	Engine runs rough in high-speed range.	(1) Clogged or damaged fuel line. (2) Dirty spark plug, or maladjusted plug gap. (3) Ignition retarded too much. (4) Improper carburetor setting. (5) Clogged air cleaner.	(1) Clean or replace. (2) Clean, or adjust. (3) Adjust. (4) Adjust. (5) Clean.

NOTE: The above guide for "rough engine" presupposes that the engine is free from overheating tendency and that it develops a sufficiently high compression pressure.

7-3. Engine gives abnormal noise.

	Symptom	Possible cause	Remedy
1.	Excessive noise coming from the interior of the engine unit. The higher the running, the higher the noise frequency.	(1) Too much clearance between piston and cylinder. (2) Piston rings too loose in the groove. (3) Piston rings stiff with carbon. (4) Too much running clearance in connecting rod big end.	(1) Repair or replace. (2) Replace the piston. (3) Clean. (4) Replace.

	Symptom	Possible cause	Remedy
1.	Excessive noise coming from the interior of the engine unit. The higher the running, the higher the noise frequency.	(5) Connecting rod small end bearing worn excessively. (6) Broken piston ring. (7) Ignition timing advanced to much. (8) Defective primary pinion of gear. (9) Crankshaft bearings worn down excessively. (10) Damaged transmission gears. (11) Defective transmission shaft bearings.	(5) Replace. (6) Replace. (7) Adjust. (8) Replace. (9) Replace. (10) Replace. (11) Replace.

7-4. Engine halts suddenly.

Make sure the fuel tank is full and the wiring harness is in good condition, before proceeding as follows:

	Symptom	Possible cause	Remedy
1.	Engine dies down abruptly. (If the bike is brought in with its engine refusing to turn, it is likely that any of the parts (1) to (3) has seized.)	(1) Piston is tending to seize. (2) Crankshaft is tending to seize. (3) Transmission gears tending to seize. (4) Spark plug bridged. (5) Defective ignition coil. (6) Defective P.E.I. unit. (7) Clogged fuel line.	(1) Repair or replace. (2) Repair or replace. (3) Repair or replace. (4) Clean. (5) Replace. (6) Repair or replace. (7) Clean.
2.	Engine dies down rather gradually.	(1) Loose spark plug. (2) Cylinder head secured loose. (3) Ruptured head gasket. (4) Clogged fuel line.	(1) Retighten. (2) Retighten the nuts. (3) Replace. (4) Clean.

7-5. Engine overheats.

The following trouble-shooting guide assumes that 1) the engine has been "broken in," 2) the lube system is in good condition, 3) the brake does not drag, and 4) the cylinder cooling fins are clean.

	Symptom	Possible cause	Remedy
1.	Engine runs smoothly but tends to overheat.	(1) Improper fuel-oil mixture ratio. (2) Wrong oil used in the mixture. (3) Clogged oil hole in the crankcase. (4) Piston rings are stiff in the groove because of carbon formation. (5) Ignition timing out of adjustment. (6) Drive chain too tight. (7) Wrong spark plug heat range. (8) Fuel-air mixture too lean.	(1) Use 20-to-1 mixture. (2) Use specified oil. (3) Clear. (4) Disassemble engine and clean. (5) Adjust. (6) Adjust. (7) Replace. Use a colder plug. (8) Adjust carburetor.

	Symptom	Possible cause	Remedy
2.	Compression pressure is too high.	(1) Carbon deposited excessively in the combustion chamber. (2) Head gasket too thin. (3) Excessive carbon deposits in muffler, exhaust pipe, or exhaust port.	(1) Decarbon. (2) Replace. (3) Disassemble and clean.

7-6. Faulty clutch.

	Symptom	Possible cause	Remedy
1.	Slipping clutch.	(1) Improper clutch adjustment. (2) Weakened clutch springs. (3) Worn clutch plates. (4) Worn clutch release screw.	(1) Set the clearance to specification. (2) Repair or replace. (3) Replace. (4) Replace.
2.	Dragging clutch.	(1) Too heavy oil. (2) Faulty movement of clutch plates in place. (3) Clutch cable maladjusted.	(1) Replace. (2) Repair or replace. (3) Adjust.

7-7. Hard gear shifting or shifting failure.

Make sure the clutch operates satisfactorily and the transmission has oil up to level.

	Symptom	Possible cause	Remedy
1.	The lever moves but gears will not mesh.	(1) Damaged groove in change cam. (2) Shift forks not moving smoothly, because of burrs or dents. (3) Damaged shift forks. (4) Gears seized. (5) Damaged gear shift shaft.	(1) Replace the cam. (2) Repair. (3) Replace. (4) Replace. (5) Replace.
2.	The lever shifts but will not return by itself.	(1) Return spring on gear shift shaft is damaged.	(1) Replace.
3.	Gears jump out of mesh.	(1) Gear shifting cam stopper is working improperly. (2) Worn or deformed gear shift forks. (3) Worn gear teeth or worn dog teeth on driven gear wheel.	(1) Check and repair or replace. (2) Replace. (3) Replace.

8. ENGINE

RL250

8-1. Engine services not requiring engine removal

The parts listed hereunder can be serviced with the engine in place:

	Parts	Operation
1.	Spark Plug	Retighten, inspect, adjust gap, remove carbon, replace; Inspect gasket for flexibility, replace
2.	Cylinder Head	Retighten cylinder head nuts; Remove carbon, check for warpage, repair
3.	Cylinder Head Gasket	Inspect, replace
4.	Cylinder	Remove carbon from ports; Check for burned spots and scoring, repair; Check for wear rebore
5.	Piston	Remove carbon from heads and ring grooves; Inspect for burned spots and scoring, repair or replace; Check piston pin holes and ring locating pins for wear, replace
6.	Piston Ring	Inspect for wear and tension, replace
7.	Piston Pin	Inspect for wear, replace
8.	Piston Pin Circlip	Inspect for warpage and dropping out, replace or repair
9.	Con-rod Small End Needle bearing	Inspect for wear, replace
10.	Flywheel Magneto	Inspect ignition timing, adjust
11.	Neutral indicator Switch	Inspect for wire break, repair or replace; Inspect gasket, replace
12.	Engine Sprocket	Inspect for wear, replace
13.	Primary Pinion	Inspect for backlash, replace
14.	Clutch	Inspect cork plates for wear, replace; Inspect free length of clutch springs, repair or replace; Check housing, for loose riveting and burrs on grooves, repair or replace, check gear backlash, replace, check push rod for bent, replace
15.	Gear Shifting Shaft	Inspect tension of shaft return spring, replace, inspect for wear, replace
16.	Carburetor	Check play in throttle cable, adjust; check float level, adjust; check fuel mixture at various throttle openings, adjust, Clean

When removing the crankcase cover to gain access to clutch parts, gear shifting shaft or any others inside in order to inspect or repair, be sure to drain out the oil in the crankcase: the drain plug is located on the right-hand side of the cover.

8-2. Services requiring removal of the engine

To carry out the following maintenance services, take down the engine from the frame, and separate the crankcase into the two halves, right and left:

	Part	Maintenance service on engine unit
1.	Crankshaft	Inspect for shake, repair or replace; Check bearings for wear, replace; Check oil seals for leakage, replace
2.	Transmission system	Check gears and shafts, adjust or replace; Check bearings and bushing, replace
3.	Gear shifting system	Inspect shifting cam groove for damage, repair or replace; Inspect shifting forks for burned spots and wear, repair or replace
4.	Kick starter system	Inspect kick starter shaft return spring, replace; Inspect ratchet for damage, replace

8-2-1. Removing engine from frame.

Before beginning the removal operation, thoroughly clean the engine with a steam cleaner or cleaning solvent to remove road dirt. Work according to the order of the following figures.

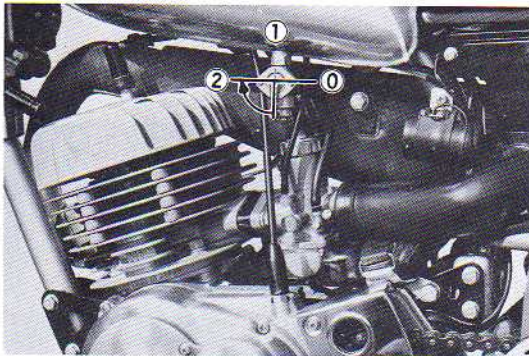


Fig. 8-1. Turning the fuel cock lever to "0"

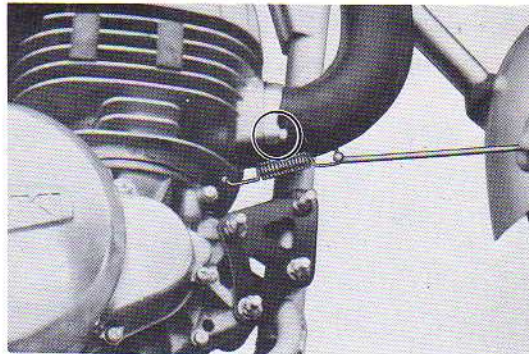


Fig. 8-2. Releasing the exhaust pipe spring and unscrewing muffler fitting bolts

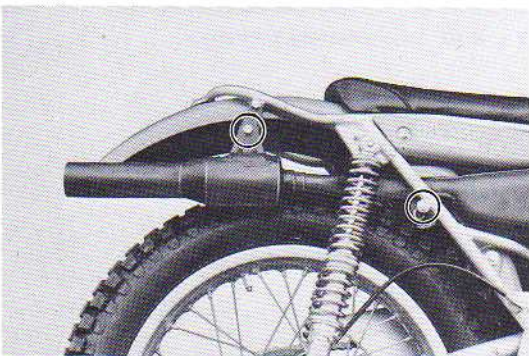


Fig. 8-3. Unscrewing muffler fitting bolts

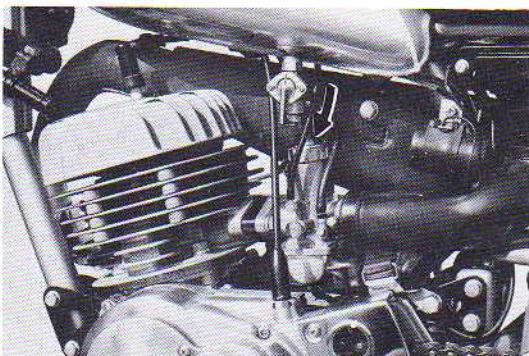


Fig. 8-4. Unscrewing air cleaner tube clamp and removing fuel hose

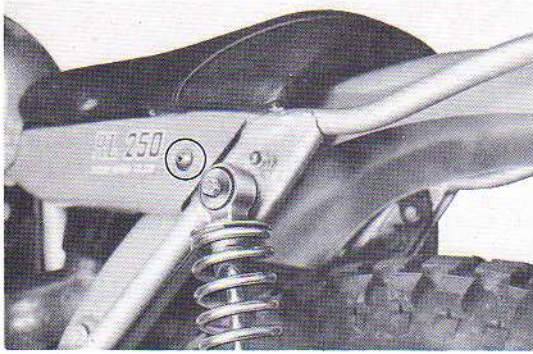


Fig. 8-5. Unscrewing the frame cover screw

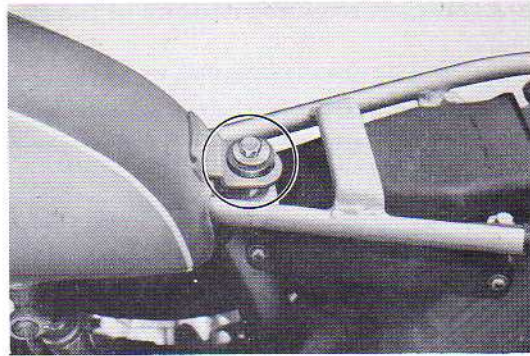


Fig. 8-6. Unscrewing the fuel tank fitting bolt

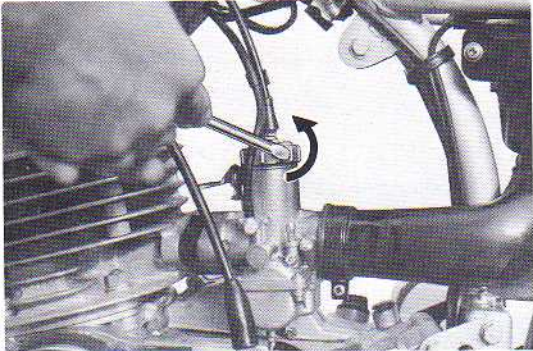


Fig. 8-7. Removing carburetor mixing chamber top

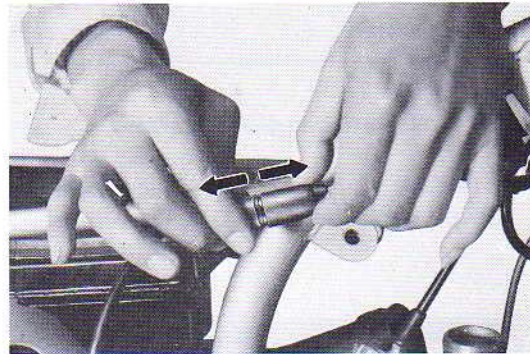


Fig. 8-8. Removing the P.E.I. unit

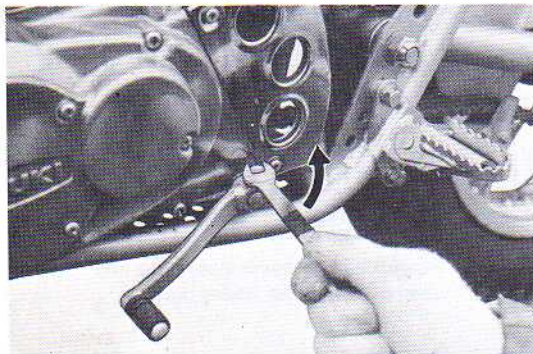


Fig. 8-9. Removing the gear shifting lever

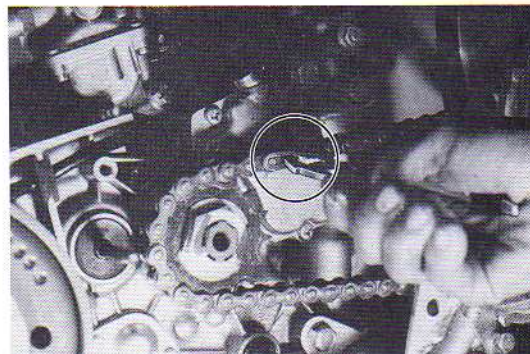


Fig. 8-10. Disconnecting drive chain

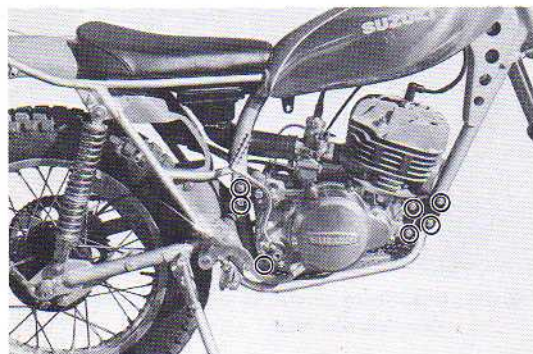


Fig. 8-11. Removing engine mounting bolts

8-2-2. Clutch cushioning device

Some cushioning materials are assembled between the primary driven gear and the clutch housing so that engine power can be transmitted more smoothly the moment the clutch is engaged. In the RL250 clutch, two varieties of coil springs have been employed in order to ensure sufficient cushioning for quick transmission of high power.

8-2-3. Primary reduction ratio

No. of teeth in primary drive gear 18
No. of teeth in primary driven gear 75
Primary reduction ratio 75/18

8-2-4. Clutch disassembly

- 1) Remove the clutch spring fitting bolts on clutch pressure plate with 10 mm wrench.
- 2) Remove the pressure plate, release rod, drive plates, and driven plates from the clutch housing.
- 3) Pry up bent lock tongue of clutch sleeve hub washer with a chisel. Using clutch sleeve hub holder (special tool 09920-51510), secure the clutch sleeve hub and loosen the clutch sleeve hub nut with 27 mm socket wrench.
- 4) Remove the clutch sleeve hub and clutch housing from the countershaft.

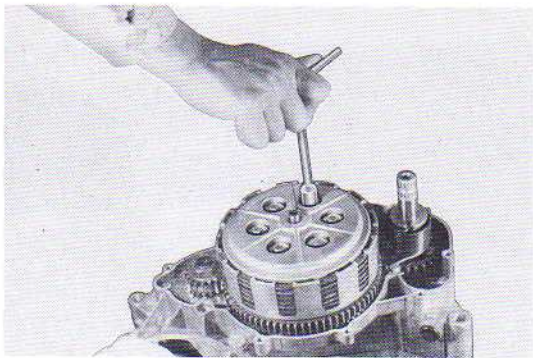


Fig. 8-12. Removing clutch fitting bolts

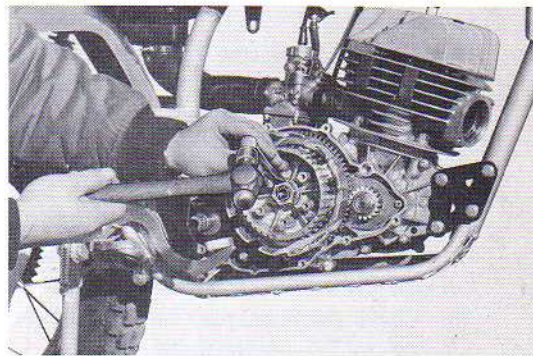


Fig. 8-13. Flattening clutch sleeve hub washer

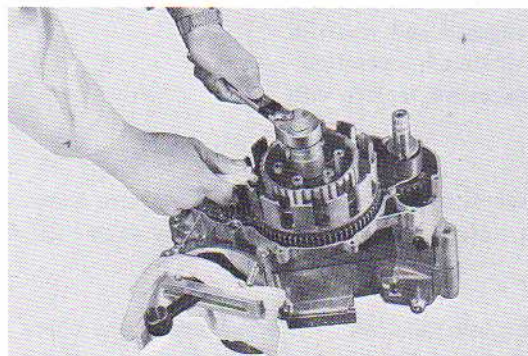


Fig. 8-14. Loosening clutch sleeve hub nut

8-2-5. Inspecting clutch parts

Improper use of the clutch, incorrect adjustments, or use of low grade transmission oil may result in excessive wear of the clutch parts. In such case, abnormal noise will be produced, or clutch slipping may develop, leading to insufficient transmission of power. Therefore, when the clutch is disassembled, the parts should be inspected carefully and any defective part found should be replaced.

1) Clutch drive plates

Inspect the clutch drive plates to see if the surfaces are burnt or roughened, and measure the thickness and warpage (run-out) to see if within the specified limits. Replace if found defective.

	Standard	Limit
Thickness	3.5 mm (0.138 in)	3.2 mm (0.126 in)
Warpage	Under 0.4 mm (0.016 in)	0.4 mm (0.016 in)

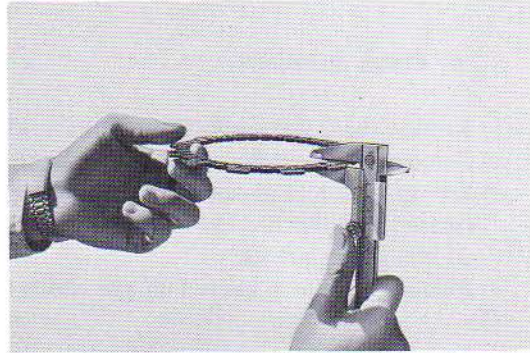


Fig. 8-15. Measuring drive plate thickness

2) Clutch springs

If the clutch spring free length should become shorter than the standard by 1.5 mm or more.

Spring free length 38.4 mm (1.15 in)

3) Clutch housing

Inspect the primary driven gear tooth surfaces for abnormal conditions. Check the axial play between the primary driven gear and the housing. Check the radial play between the clutch housing and the countershaft.

4) Clutch sleeve hub

If there are dented wear in the clutch sleeve hub splines, the clutch driven plates may stick when the clutch is disengaged and result in losing the smoothness of clutch operation. Repair or if the wear is excessive, replace with new part.

5) Clutch release screw

Check for excessive looseness by moving the release screw arm back and forth. If excessively loose, cracked, or injured, the clutch will not operate smoothly so in such case, replace the entire release screw assembly.

6) Clutch push rods

Pull out the two clutch push rods from the countershaft and check them for bending by rolling them on top of surface plate. A bent push rod will contact partially inside the countershaft during operation, resulting in eccentric wear, so that it should either be repaired or replaced.

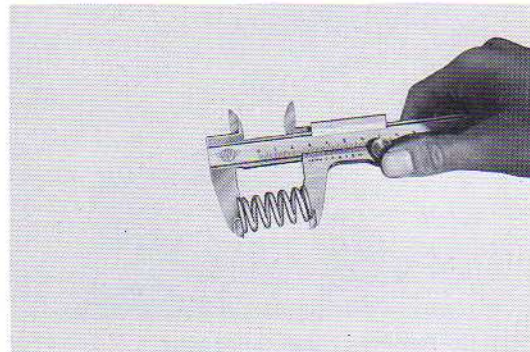


Fig. 8-16. Measuring clutch spring free length

